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ABSTRACT

Eighty-six elementary and secondary undergraduate teacher education students exhibiting low and moderate levels of self-efficacy belief were randomly assigned to observe two types of instruction and two types of attributional feedback concerning teaching a child how to find the main idea of a paragraph. The research focused on the effects of two types of material presentation--direct instruction versus cognitive modeling, and the effects of watching a demonstration of that skill with two types of guiding comments--task-oriented versus self-efficacy statements. Analyses of variance were performed on each dependent measure. Results suggest that, for students exhibiting initial low self-efficacy beliefs, cognitive modeling is more effective for raising estimates of success and self-efficacy beliefs than is direct instruction. (Author/JD)

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Cognitive Modeling Effects

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Effects of Cognitive Modeling and Task-Oriented Attributions on
Prospective Teachers' Self-Efficacy

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Abstract

Undergraduate teacher education students exhibiting low and moderate levels of self-efficacy belief were randomly assigned to observe two types of instruction and two types of attributional feedback concerning teaching a child how to find the main idea of a paragraph. Dependent measures were their self-efficacy beliefs regarding teaching the skill and their predicted persistence in teaching the skill. Two (cognitive modeling vs. direct instruction) by two (self-efficacy vs. task-oriented statements) by two (low vs. moderate beliefs) ANOVAs were performed on each dependent measure. Results suggest that, for students exhibiting initial low self-efficacy beliefs, cognitive modeling is more effective for raising estimates of success and self-efficacy beliefs than is direct instruction.

Effects of Cognitive Modeling and Task-Oriented Attributions on
Prospective Teachers' Self-Efficacy

Researchers applying self-efficacy theory in studies of teacher beliefs and teacher training have found that a number of different teacher behaviors are associated with high self-efficacy beliefs (Ashton & Webb, 1986; Gibson & Dembo, 1984). Since teachers are expected to manage a wide range of social and academic processes in the course of a school day, their beliefs concerning the efficacy of their efforts can be important determinants of their persistence and of the quality of their efforts. Thus, the training programs that attempt to instill appropriate skills and attitudes in prospective teachers may need to consider the effects of their training on efficacy beliefs of prospective teachers.

Training programs designed to increase individuals' self-efficacy beliefs and resultant behavior associated with those beliefs have shown positive effects related to certain ways the training is presented. Some studies have shown that modeling of specific skills or persistence increases self-efficacy beliefs (Feltz, Landers, & Raeder, 1979; Kazdin, 1979; Schunk, 1981; Schunk & Hanson, 1985; Zimmerman & Ringle,^a 1981). Other studies, emphasizing the role of external attributions, have demonstrated that positively stated

beliefs in the efficacy of effort increase self-efficacy beliefs and persistence levels (Gorrell & Partridge, 1985; Schunk, 1982).

Recently, Gorrell and Capron (in press) explored conditions under which education students may be taught specific skills needed to teach children effectively. Interest centered upon the effects of two types of presentation of material, direct instruction and cognitive modeling, and the effects of watching a demonstration of that skill with two types of guiding comments, task-oriented or self-efficacy statements. In direct instruction an instructor uses traditional lecture format including explanation of concepts, presentation of examples, demonstrations, and summarization; in cognitive modeling the instructor systematically and carefully reveals his or her thoughts and reasoning during the execution of a task. The specific skill taught was how to teach a child to find the main idea of a paragraph, a complex, and often difficult comprehension skill to master.

Gorrell and Capron (in press) found that for undergraduate education students cognitive modeling was a more effective procedure than direct instruction in raising prospective teachers' estimates of the probability of their success and estimates of their persistence levels; they also found that task-oriented statements were more effective than self-efficacy statements in raising their estimated persistence levels in teaching this difficult skill.

Subjects in the Gorrell and Capron study exhibited a mixture of low and moderate levels of self-efficacy beliefs prior to treatment with the majority at the moderate level. Since there was no attempt in that study to differentiate subjects according to levels of belief, the current study explored the conditions that pertained to students who exhibited low self-efficacy estimates vs. those who exhibited moderate levels of self-efficacy. Interest centered upon the effects of two types of presentation of material, direct instruction versus cognitive modeling, and the effects of watching a demonstration of that skill with two types of guiding comments, task-oriented versus self-efficacy statements.

Hypotheses were that, for the low self-efficacy group (those who initially estimated the chances of their success in teaching the skill as being 65% or less), the cognitive modeling conditions and the self-efficacy conditions would lead to higher levels of self-efficacy belief and greater predicted persistence in attempting the task than would direct instruction and the task-oriented statements. It was further hypothesized that the moderate self-efficacy group (those whose estimates of chances of success ranged from 80% to 85%) would be affected more strongly by cognitive modeling and by task-oriented statements than by direct instruction and self-efficacy conditions, as found previously by Gorrell and Capron. Thus, it was hypothesized that both groups would respond

more favorably to cognitive modeling conditions but that there would be differential responses to self-efficacy and task-oriented statements, depending upon the initial levels of self-efficacy beliefs.

Method

Subjects

Subjects, 86 elementary and secondary education majors enrolled in introductory education and child development courses at a state regional university and who exhibited low (estimates of success less than or equal to 65%) or moderate (estimates of success from 80% to 85%) levels of self-efficacy beliefs on a scale related to teaching, were partitioned according to their level of self-efficacy beliefs and then randomly assigned to one of four experimental groups. These subjects were derived from a pool of over 150 students who completed the questionnaire in their classes, comprising a complete range of possible education majors. The students majored in elementary education, secondary education, health and physical education, and special education.

Instruments

Instruments were the following:

- a. A Potential Teacher's Attitude Questionnaire (PTAQ), which uses 13 Likert-style items to assess general self-efficacy beliefs and self-efficacy beliefs specific to the teaching and learning process.

This type of instrument often is used in self-efficacy studies because of the high face validity related to predicted behaviors.

b. A prediction in percentage terms of the subject's expectations of being able to teach the main idea of a paragraph to a student.

c. A rating of the presenter of the taped lecture on teaching the main idea of a paragraph. This sheet evaluated the presenter in terms of her self-confidence, directiveness, concern for student progress, enjoyment of teaching, competence, similarity to the observer, and warmth on Likert-type scales.

d. A rating of the college student in the videotape, evaluating the college student in terms of her self-confidence, directiveness, concern for student progress, enjoyment of teaching, competence, similarity to the observer, warmth, and ability to achieve success on Likert-type scales.

e. A set of questions to determine what the subject would do and how long the subject would be willing to spend trying to teach a hypothetical slowly-learning student the main idea of a paragraph.

Procedure

In small groups, subjects (2 to 5 Ss per group) were presented with one of two versions of a twenty-minute videotape showing an instructor explaining how to teach a child to find the main idea of a paragraph. The video-taped presenter was the same in both cases. In one case, the presenter explained the procedures in standard direct

instruction form: Lecture with examples and carefully listed directions for teaching this skill. In the other case, the presenter engaged in cognitive modeling: A description of how she reasoned her way through the steps of teaching the main idea of a paragraph. The amount of information presented and the amount of time spent in the video presentations were virtually the same for both groups.

Following the video presentation, subjects completed the PTAQ, the rating sheet on the presenter, and also estimated in percentage terms their chances of teaching the skill. They then were shown one of two versions of the demonstration tape, in which a college student attempted to teach a sixth-grade girl who was slow at grasping the concept of main ideas of paragraphs. Both videos were the same; in one case, additional taped comments by the college student expressed high levels of positive self-efficacy belief related to her ability to teach the sixth grade student (e.g. "At this point I knew that to be successful I just needed to apply what I had learned from the film and get her involved"); in the other case, task-oriented statements of fact related to what she was doing in the video were presented (e.g. "There seemed to be a lot of words she didn't know, so I decided to concentrate on looking up some of the words.") The placement, number and extensiveness of the comments remained the same in each case.

Finally, subjects were readministered the PTAQ, completed the rating sheet concerning the college student in the video, and estimated in percentage terms their chances of teaching the skill. In addition, they completed a form where they predicted what they would do and for how long they would attempt to teach a similar student how to find the main idea of a paragraph. This final measure was a more specific description of a potential teaching situation designed to approximate the actual conditions under which a person might be faced with the task of teaching a specific slowly-learning student.

As in the earlier study, the decision to use self-reported behavioral intentions as dependent measures rested upon evidence that, under certain specific conditions, an attitude is a good predictor of behavior. In particular, when an attitude incorporates a specific behavioral intention (Fishbein and Ajzen, 1975), and when attitudes and behaviors are highly specific (Ajzen and Fishbein, 1977), the potential discrepancies between attitudes and behavior are greatly reduced. Since predictions within self-efficacy theory depend on the careful specification of attitudes and behaviors, using behavioral intentions as a dependent variable can provide meaningful information.

Results

A 2 (low vs. moderate scorers) x 2 (direct instruction vs. cognitive modeling) x 2 (task-oriented vs. self-efficacy statements) repeated measures ANOVA was performed on the initial estimate of success, the estimate following treatment 1 (exposure to the videotaped lecture), and the estimate following treatment 2 (exposure to the videotaped demonstration). A significant main effect for successive estimates of success was found from the initial estimate to the estimate following treatment 1, $F(1,79) = 36.37$, $p < .001$, and from that estimate to the one following treatment 2, $F(1,79) = 11.51$, $p < .001$.

There also was a significant interaction between type of instruction and the difference between the initial success estimate and the estimate following treatment 1, $F(1,79) = 4.91$, $p < .05$; estimates of success were raised significantly higher for the group that saw the cognitive modeling lecture than for the group that saw the direct instruction lecture. A significant second-level interaction among groups, types of instruction, and changes in the initial estimates following the video-taped lectures showed that the low self-efficacy group was influenced significantly more by the cognitive modeling lecture than was the moderate-level group.

For the final estimate of probable success based upon a specifically detailed case of a student who the Ss potentially could

have been assigned to teach, group 2 (moderate) expressed higher estimates than group 1 (low), $F(1,79) = 29.06$, $p < .001$; additionally, for the low group exposure to direct instruction was more effective than for exposure to cognitive modeling, $F(1,74) = 5.57$, $p < .05$. Figure 1 shows the changes in the low groups' estimates in comparison with the overall stability of the moderate groups' estimates.

Insert Figure 1 about here

For the self-efficacy scale following treatment 1, a 2 (low vs. moderate scorers) x 2 (direct instruction vs. cognitive modeling) x 2 (task-oriented vs. self-efficacy statements) MANOVA repeated measures analysis revealed a significant interaction between type of instruction and type of comments following treatment 1, $F(1,78) = 8.05$, $p < .01$. This effect for demonstration type, occurring before that particular treatment, indicated that the combination of self-efficacy and cognitive modeling and of direct instruction and task-orientation was an entry characteristic related to higher self-efficacy beliefs.

The MANOVA repeated measures analysis between treatment 1 and treatment 2 administrations of the PTAO revealed no significant main

effects. However, a significant interaction between group and type of instruction, $F(1,78) = 3.84$, $p < .05$, showed that for group 1 (low) direct instruction raised self-efficacy beliefs and for group 2 (moderate) cognitive modeling raised self-efficacy beliefs. Table 1 shows the means and standard deviations for the group by type of instruction interaction related to the administration of the PTAQ following treatment 1.

Insert Table 1 about here

As a measure of persistence, a 2 (low vs. moderate scorers) x 2 (direct instruction vs. cognitive modeling) x 2 (task-oriented vs. self-efficacy statements) ANOVA was performed on the estimate of amount of time the subjects were willing to spend attempting to teach the main idea of a paragraph to a particular slow learner, described following treatment 2. The moderate group expressed a higher persistence level than the low group, $F(1,79) = 3.94$, $p < .05$. Additionally, a Pearson correlation between the persistence measure and the specific percentage estimate showed a significant but moderate correlation, $r = .25$, $p < .01$. Table 2 shows the means and standard deviations for persistence estimates.

Insert Table 2 about here

Finally, ratings of the videotaped lecturer and of the teacher in the videotaped demonstration were subjected to a 2 (low vs. moderate scorers) x 2 (direct instruction vs. cognitive modeling) x 2 (task-oriented vs. self-efficacy statements) MANOVA. A significant multivariate effect for type of instruction was found related to the lecturer; in general, the cognitive modeling group rated the lecturer more positively than did the direct-instruction group. Univariate analysis revealed three items out of 7 that the cognitive modeling group rated significantly more positively. The cognitive modeling group expressed greater disagreement with the statement that the lecturer was "uncertain that her method will eventually succeed", $F(1,79) = 4.16, p < .05$; the same group agreed more strongly with statements that the lecturer was "a warm person", $F(1,79) = 7.32, p < .01$, and that she was "enjoying the process of presenting material", $F(1,79) = 5.76, p < .05$.

A significant multivariate effect concerned with task-oriented and self-efficacy statements was found related to the teacher in the videotaped demonstration; in general, the task-oriented group rated

the teacher more positively than did the self-efficacy group. Univariate analysis revealed that task-oriented statements were associated with greater agreement with the statement that the teacher was "confident of obtaining student progress", $F(1,79) = 20.79$, $p < .001$. The differences in the means on this particular item (1.51 vs. 2.27 on a 5-point scale) apparently accounts for the total differences found in general in the multivariate analysis.

Discussion

In general, it was found that there was an overall increase in success estimates related to teaching a difficult skill (finding the main idea of a paragraph) for the total sample from the earliest to the latest observation, irrespective of group or combination of treatments. This finding is understandable simply in terms of the expectable gains in self-efficacy beliefs that would accompany acquisition of practical knowledge in whatever form.

In addition, current results show that the mode of presentation of information significantly influences success estimates. In an earlier study, subjects initially ranged in their beliefs from low to moderate levels without differentiating levels of success estimates in the analysis. When the current results are broken down by type of instruction, cognitive modeling groups show the greatest gains in success estimates, a confirmation of the Gorrell and Capron (in press) finding. Additionally, the interaction between group and type

of instruction reveals that the low group had greater gains in success estimates when exposed to cognitive modeling than did the moderate group.

Analysis of responses to the PTAQ shows that changes in self-efficacy beliefs following treatment 1 exhibit aptitude by treatment interactions. Moderate-level subjects responded more to cognitive modeling conditions than to direct instruction conditions, while low-level subjects responded more to direct instruction. Why direct instruction contributes more to self-efficacy beliefs (PTAQ) among individuals who have low estimates of success is not entirely clear. It is possible that, for such individuals, the more traditional method of teaching provides a recognizable and immediately identifiable framework for prospective teachers who are concerned about their prospects of learning effective teaching methodology. If prospective teachers are not overly concerned about whether they can perform competently, they may find it easier to place themselves in the role of the instructor who is demonstrating procedures through cognitive modeling.

Although there were differences found related to self-efficacy enhancement statements and task-oriented statements at the administration of the PTAQ immediately following treatment 1, treatment associated with those variables had not been introduced in the study, and thus, should be considered to be entry characteristics

of the two groups. No interpretation related to treatment can be made based upon differences found at that point in the study. Following treatment 2, there were no differences related to self-efficacy enhancement statements found among groups.

A interesting underscoring of the effects of direct instruction was found at the point where subjects responded to a very specific description of a student having trouble learning how to find the main idea of a paragraph. When subjects estimated their chances of successfully teaching this student, subjects in the low group who had been exposed to direct instruction showed significantly higher levels of expectation for success compared to cognitive modeling. Up to this point, related to estimates of success, cognitive modeling groups exhibited significantly higher estimates than the direct instruction groups. A possible interpretation of this change is that, at the point where success estimates have risen to moderate levels for the initially low-efficacy group, the experiences associated with direct instruction become more salient and influence subjects differentially. A further hypothesis is that the degree of specificity of the issue being raised at this point in the study enables the direct instruction group to see more particular ways of being successful than does the cognitive modeling experience, which tends to exert its effect upon the low group by means of heightened identification with the model.

That groups do respond to the manipulated variables in the videotapes is revealed in the analysis of their ratings of the lecturer in treatment 1 and to the demonstration teacher in treatment 2. In the ratings of the lecturer, the cognitive modeling group was more positive than the direct instruction group. In particular, the cognitive modeling group rated the lecturer as being warmer and as enjoying the process of teaching more than did the direct instruction group. They also perceived the cognitive modeling lecturer as being more confident in the eventual success of her methods. This finding is consistent with self-efficacy theory and other findings that efficacious models tend to affect others' efficacy beliefs positively (Schunk & Hanson, 1985). Perception of such characteristics within the lecturer could lead to greater suasive power in changing a person's own sense of efficacy. This would be especially true for a low-self-efficacy person who may respond to perceived warmth and confidence in a model. Social psychology investigations of modeling suggest that perceptions of model as being credible and likable can lead to greater persuasion (Lindzey & Aronson, 1985).

For the ratings of the teacher in the demonstration tape, the task-oriented group reacted more positively than did the self-efficacy enhancement group. In fact, the differences in the two groups' ratings of the teacher was so pronounced on one variable, "confidence of obtaining student progress", that it appears to have

been the item that created an overall multivariate effect.

Perception of the teacher as being more confident during the presentation of task-oriented statements concerning her methods is initially surprising, since it is the other set of statements that is directly focused upon displaying confidence. However, it is understandable that a matter-of-fact approach that is concerned solely with identification of techniques and choices employed in the actual teaching would imply a high, though unstated, level of confidence in one's own ability. One does not need to state personal confidence when that is not an issue in the proceedings. The repeated emphasis on confidence in the self-efficacy treatment may have implied to the watchers that the teacher was actually less confident of herself and was trying to put up a false front.

The only measured dimension in which both the lecturer and the demonstrator were perceived as differing among the various groups was in their level of self-confidence (i.e. self-efficacy). One implication of this is that, when modeling involves the transmission of information as a major goal, observers may be particularly disposed to perceive and evaluate the model in self-efficacy terms. If this constitutes a reliable phenomenon, such a perceptual orientation would make self-efficacy theory a preeminently important conceptual model for the understanding and improvement of teaching effectiveness. However, while observers may be highly sensitive to

communicator self-efficacy, the data from the demonstrator evaluations cautions us that the successful creation of high self-efficacy beliefs is neither easy to accomplish nor always predictable from its logical antecedents. Hence efforts to enhance self-efficacy beliefs must include some form of documentation concerning whether the employed methods produce the level of communicator self-efficacy intended.

A finding that subjects in the moderate group expressed greater willingness to persist in the task of teaching a slow learner the targeted skill is consistent with self-efficacy theory, which predicts that higher levels of confidence will be associated with higher levels of persistence. A moderate correlation between persistence estimates and estimates of chances of success also support self-efficacy theory's description of such an association. Although there were no significant differences found related to conditions that might increase this persistence level, it is worth noting that such a relationship between self-efficacy belief and persistence is present.

Overall, hypotheses concerning the effects of cognitive modeling were confirmed. There do appear to be differential effects of type of instruction and type of comments (self-efficacy or task-oriented), depending upon the initial level of subjects' self-confidence. Further studies related to cognitive modeling could focus upon the

effectiveness of the method related to actual teaching behavior and to acquisition of professional knowledge.

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Table 1

Means and Standard Deviations for the PTAQ
Following Treatment 1.

Group	Type of Instruction			
	Direct Instruction		Cognitive Modeling	
	M	SD	M	SD
Low	27.05	5.01	30.68	5.31
High	32.36	5.39	28.19	3.88

Note: Maximum scores on the PTAQ is 65. Lower numbers indicate higher self-efficacy beliefs.

Table 2

Means and Standard Deviations for Persistence Scores.

Group	Type of Instruction			
	Direct Instruction		Cognitive Modeling	
	M	SD	M	SD
Low				
Self-Efficacy	3.50	2.54	3.00	2.21
Task-Oriented	3.36	2.06	4.18	1.17
Moderate				
Self-Efficacy	4.30	2.00	4.18	1.60
Task-Oriented	4.64	1.63	4.27	2.00

Note: Maximum score^a for persistence is 7.

Figure 1.

Changes in percentage estimates for low efficacy groups.

